

**A Proposal for the  
Persistent Effects of Treatment Studies (PETS)  
Longer-term Adolescent Study**

Prepared for the:  
Center for Substance Abuse Treatment  
Substance Abuse and Mental Health Services Administration

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## **Background**

CSAT has developed PETS as a family of coordinated studies that will evaluate the outcomes of drug and alcohol treatment received through a wide range of publicly funded programs employing a varied mix of treatment methods. Populations to be studied are diverse in the nature and severity of their substance abuse, and in their personal characteristics and circumstances. The conceptual underpinning of the PETS studies is a recognition that substance abuse disorders while variable in their manifestations are often chronic and prone to relapse. PETS is to focus on the longitudinal course of substance abuse and treatment. While most previous outcome studies in the field have examined changes taking place for only several months after a particular treatment episode, PETS will look at outcomes over a longer time period of 3 years or more. In the context of the client's life history, careful attention will be given to the stage in his or her experience of substance abuse and treatment to what has preceded their current treatment episode, and to any sequence of aftercare, relapse, and subsequent treatment that may follow.

The proposed research design for the Longer-term Adolescent Study is intended to create an adolescent follow-up study that builds upon CSAT-funded adolescent substance abuse treatment outcome studies that are already underway and begins to address the limitation of our understanding of adolescent substance abuse treatment. This collaborative effort between the PETS study team and existing CSAT grant programs allows for maximization of the amount of time the follow-up period can be extended. Building on existing studies also enables CSAT to capitalize upon the efforts of other investigators to maximize the return on resources and render a more efficient and economical follow-up study. An additional advantage of this strategy compared to developing a new set of studies is that much needed findings can be disseminated much more quickly.

The PETS Longer-term Adolescent Study team will add additional interviews to follow adolescents 30 months after treatment. Not only will this yield longer-term outcomes, but combining the PETS data with interviews already conducted yields a longitudinal design with multiple waves of data collection, allowing CSAT to examine trajectories for the various outcomes.

### **PETS Longer-term Adolescent Sites**

Seven data collection sites from two different CSAT-funded grant programs were selected for inclusion in PETS Longer-term Adolescent Study. Two groups of CSAT grantees include three sites from the Adolescent Treatment Models (ATM) group and four treatment sites from the Cannabis Youth Treatment (CYT).

**The ATM Sites:** The three of the Adolescent Treatment Models (ATM) sites are in Los Angeles, California, Tucson, Arizona and Oakland, California.

In Los Angeles, California, the Phoenix Academy is a therapeutic community modified for adolescents. The innovative Phoenix Academy treatment model combines an intensive residential community milieu with an on-site accelerated education program run by the County Department of Education. Counselors and board certified teachers work together to provide a seamless and supportive therapeutic community environment. A full continuum of care is provided, including community prevention and intervention programs, residential treatment and academic programs, vocational training, family and youth preparation for re-entry into the home, and an aftercare program. Residential treatment generally lasts 12 months and is followed by a year of aftercare.

In Tucson, Arizona, La Cañada is a three-phase step-down program that accepts adolescents from the five southern counties of Arizona that are located just north of the US/Mexico border. The first phase is a one-month residential phase, followed by a two-month intensive outpatient phase. The last phase is a two-month non-intensive outpatient phase. In phase I (Residential Treatment) the therapeutic regimen includes at a minimum: one hour of individual therapy per week, five hours per week of group therapy, three hours per week of psychoeducational groups and four hours of case management services per month. In phase II (Intensive Outpatient) the activities include at a minimum family and individual therapy (1.5 hours/week), family activities (3hours/week), community activities (5 hours/week) and family case management (4 hours/week). In phase III (Non-Intensive Outpatient/Aftercare) activities include at a minimum individual and family therapy (1 hour/month), family case management (4 hours/week), family activities (2 hours/month) and community activities (10 hours/week).

In Oakland, California, Thunder Road is a 50-bed intensive residential treatment program with extended outpatient aftercare for male and female adolescents. Its treatment model draws on the strongest aspects of four treatment modalities -- medical model, therapeutic community, 12-Step and family involvement. Two treatment tracks operate within the setting, including an intermediate stay of 30-45 days duration and a longer-term stay of up to 12 months that allow access for clients and families through both public and private sector funding. As a therapeutic community, 16 different group processes are integral to the comprehensive model of care/intervention, as well as individual client-focused treatment planning, psychosocial assessment, and medical/ psychiatric evaluations. An accredited school is operated on-site by the Alameda County Department of Education. A step-down model, designed as a 12-month involvement with the treatment community, provides aftercare following discharge to the community upon completion of the residential treatment phase.

**The CYT Sites:** The Cannabis Youth Treatment (CYT) cooperative agreement is the largest experimental study of outpatient adolescent substance abuse treatment to date. It is a collaboration among CSAT, two of the nation's largest adolescent treatment providers (Chestnut Health Systems and Operation

PAR) and two major medical centers (University of Connecticut Health Center and Children's Hospital of Philadelphia). Five manualized approaches have been adapted to, and tested, in these treatment programs.

Three treatments were provided on an outpatient basis at each of four sites; one treatment type is common to all four sites: a combination of Motivational Enhancement Therapy (MET) and Cognitive Behavioral Therapy (CBT). Adolescents were assigned to one of the treatment types on a random basis.

- The treatment approaches for the Alcohol Research Center (ARC) in Farmington, Connecticut and Operation PAR in St. Petersburg, Florida are:
- MET/CBT5: This treatment consisted of two individual MET sessions and three CBT sessions over five weekly periods;
- MET/CBT12: Adolescents in this group received two individual MET sessions and 10 weekly CBT sessions; and
- Family Support Network (FSN) consisting of MET/CBT12 plus engagement-type case management, family support groups and aftercare.

The treatment types for Chestnut Health Systems in Madison County, IL (CHS-MC) and the Children's Hospital of Philadelphia (CHOP) in Philadelphia, PA are:

- MET/CBT5: This treatment consisted of two individual MET sessions and three CBT sessions over five weekly periods;
- Adolescent Community Reinforcement Approach (ACRA) consisting of 10 sessions with the adolescent and four with caregivers, for 12 weeks; and
- Multi-dimensional Family Therapy (MDFT) consisting of 12 weeks of 12-15 session individual family-focused treatment.

## **Research Questions**

The primary research questions proposed for the Longer-term Adolescent Study are as follows.

1. What are the longer-term (30-month) substance use and other outcomes associated with specific substances, treatment methods, and critical demographic subgroups:
  - Substances: alcohol, marijuana, cocaine, opiates, and polysubstances;
  - Treatment methods: outpatient continuing care, intensive outpatient, short-term residential/inpatient, longer-term residential (therapeutic communities), and manualized treatments (e.g., CBT, MET);
  - Demographic groups: urban/rural youth, males/females, first-time offenders/repeat offenders/non-offenders, court mandated treatment clients/voluntary treatment clients, abused/non-abused youth, active users in home/alcohol and/or drug-free home.
2. What are the different substance use outcome trajectories evidenced by adolescents over the 30-month follow-up, and do these vary by patient characteristics such as age, prior treatment history, psychopathology (e.g., conduct disorder), and executive cognitive functioning?

3. To what extent does treatment engagement as well as post-treatment factors such as engagement in continuing care, peer group affiliation and success at school or work moderate or mediate longer-term substance use outcomes?
4. What is the effect of subsequent, independent treatment episodes on longer-term substance use outcomes?
5. What is the effect of developmental factors (e.g., age, timing of puberty (for females), successful role functioning) on substance use trajectories and other outcomes?
6. To what extent do youth with comorbid conditions receive treatment for these disorders, and how are these adjunctive services related to outcomes such as continued substance use?
7. How do differences (e.g., impairment) in executive cognitive functioning impact adolescents' response to treatment and longer-term outcomes?
8. Does longer-term adjustment vary as a function of positive, adaptive behaviors on the part of the adolescent?
9. To what degree are substance use outcomes related to outcomes in other important domains, such as psychiatric symptomatology, school and work functioning, and peer group behavior? Does the nature of these relationships change over the course of the follow-up period?

## **Sample**

**ATM Recruitment:** The Los Angeles, Phoenix Academy, site recruited adolescents while they were in Los Angeles County juvenile detention centers. To be eligible, youths had to be referred by the Probation Department to Phoenix Academy or one of six comparison group homes. Of the adolescents recruited, 229 were referred to the Phoenix Academy. In addition, adolescents had to be between the ages of 13 and 17, remain in custody long enough to be interviewed (usually 24 hours after referral), and assent to participate in the study. All such youths were invited to participate in the study, and only 1 percent declined to do so. Because the Los Angeles study uses an intent-to-treat analytic plan, youths were included even if they were subsequently not admitted to the program to which they were referred; 177 were ultimately admitted to Phoenix Academy House. The PETS study will attempt to conduct follow-up interviews with the 229 subjects. (Of these, only 212 were available for demographic description in Table 2.)

Tucson, La Cañada, the only site that is still enrolling subjects, accepts adolescents from the five southern counties of Arizona. Approximately three fourths of the adolescents are either private pay, referred from Health Maintenance Organizations, or are referred from the Community Partnership of Southern Arizona (the social service funding entity for the five southern counties in Arizona).

During the intake and admissions process, La Cañada staff provides parents or guardians with information about the study. If parental/guardian informed consent is granted for the adolescent and the adolescent also grants informed consent the client is enrolled into the study. Adolescents are presumed to be

competent to provide informed consent. The consent forms and corresponding paperwork are given to the University of Arizona research and evaluation staff who contacts the adolescent to arrange for the baseline interview. The baseline interview takes place within one week after admission to treatment. Of the parents/guardians and adolescents that the Tucson site approached while the adolescents were entering treatment, 199 (97.7 percent) agreed to participate.

Oakland, Thunder Road, participants were drawn from all those admitted into treatment at Thunder Road, through either the Hospital Track or the Group Home Track during the 12 month recruitment period. During the intake and admissions process, staff provided parents or guardians with information about the study. If parental/guardian permission (informed consent) was granted for adolescents under the ages of 18, project staff from the Public Health Institute made contact with each new client at Thunder Road. These contacts took place within one week after admission to treatment, and usually within the first 72 hours. Of the 240 adolescents who were screened at the Oakland site, 222 (93 percent) of the adolescents and their parent/guardians agreed to participate.

To be included in the study, the adolescent must have been between the ages of 13 and 19 at intake, and they must have been admitted to one of the two treatment tracks during the study recruitment period. Exclusion criteria are: opiate as a drug of choice or an adult-level felony conviction for other than drug-related violations. The treatment program also applied certain exclusionary criteria that precluded certain adolescents from admission to the facility including presenting with behaviors that were violent, posing a threat to self or others, actively psychotic or suicidal. No other screening methods were in place.

**CYT Recruitment:** All Cannabis Youth Treatment (CYT) sites recruited adolescents through their existing treatment systems, criminal justice systems, school systems, local doctors/clinics, advertising and by word of mouth. Three of the four sites (Operation PAR, CHS - Madison County, IL, and Children's Hospital of Philadelphia) were largely able to screen adolescents as part of the general intake to their associated treatment systems. All sites tried to make weekly contact with the main referral agents at the criminal justice and school system. They did the same with physicians and clinics, but only twice a year. Two of the sites also tried radio advertising developed in collaboration with the station and local schools (including several spots written and produced by adolescents). Both print and other media targeted different messages at professionals, parents and adolescents. All sites invested significantly more resources in recruitment than originally anticipated in order to meet their recruitment goals. The CYT recruitment phase ended in February 2000.

At baseline, patients were selected for inclusion in the CYT study if they: (1) were between the ages of 12 and 18 years; (2) had used marijuana during the previous 90 days (or 90 days prior to being placed in a controlled environment); (3) reported at least one of the DSM-IV lifetime symptoms of Cannabis Abuse or Dependence; (4) met American Society for Addiction Medicine (ASAM) 1996 patient placement criteria for

level I (outpatient) or level II (intensive outpatient); (5) understood and signed the informed consent form; and (6) had a parent or significant other who understood and signed the collateral consent form.

Patients were excluded from CYT participation if they: (1) had used alcohol 45 or more days of the previous 90 (or the 90 days prior to being placed in a controlled environment); (2) had used drugs other than marijuana 13 or more days of the previous 90 (or the 90 days prior to being placed in a controlled environment); (3) had an acute medical or psychiatric condition requiring immediate treatment and/or were likely to prohibit full participation in treatment and/or could not be managed in this level of care; (4) appeared to lack sufficient mental capacity to understand the consent and/or participate in treatment; (5) were living outside the program's catchment area or expected to move out of that area within the next 90 days; (6) had a history of violent behavior, severe conduct disorder, predatory crime or criminal justice system involvement that was likely to prohibit full participation in treatment (e.g., pending incarceration); (7) lacked sufficient English proficiency to participate in treatment; (8) lacked a collateral with sufficient English proficiency; or (9) previously participated in the study.

Table 1 shows the number of adolescents in the CYT sites by treatment type. Participants were recruited until the targets for each treatment group were met. A total of 600 participants were recruited, with 100 in each site.

**Table 1. Cannabis Youth Treatment (CYT) Baseline Sample, by Site and Treatment Condition**

Condition	Number of CYT Clients (% of total)			
	Alcohol Research Center	Operation PAR	Chestnut Health Systems Madison County	Children's Hospital of Philadelphia
Motivational Enhanced Treatment/ Cognitive Behavior Therapy - 5 (MET/CBT5)	46 (35%)	54 (32%)		
Motivational Enhanced Treatment/ Cognitive Behavior Therapy - 12 (MET/CBT12)	44 (33%)	56 (33%)		
Family Support Network (FSN) + MET/CBT12	42 (32%)	58 (35%)		
Motivational Enhanced Treatment/ Cognitive Behavior Therapy - 5 (MET/CBT5)			42 (28%)	58 (38%)
Adolescent Community Reinforcement Approach (ACRA)			54 (36%)	46 (31%)
Multi-dimensional Family Therapy (MDFT)			54 (36%)	46 (31%)
Total	132	168	150	150

Table 2 summarizes the sample characteristics. Over 85 percent of the PETS Longer-term Adolescent Study sample were between the ages of 15 and 18 when they entered treatment. At the 30-month follow-up, most would be between the ages of 18 and 20. This is a peak period of substance use and the PETS team is in an advantageous position to stay in contact with the adolescents and complete follow-ups during this critical age period. The sample also includes sufficiently large subsamples to support matching and/or subgroup analyses, including females (23 percent), minorities (50 percent), single parent families (50 percent), prior substance abuse treatment (39 percent), attention-deficit/hyperactivity disorder (54 percent), and conduct disorder (66 percent).



**Table 2. Baseline participant characteristics of CYT and ATM clients by site and overall**

	Sites							
Characteristics	Los Angeles <sup>1</sup>	Tucson	Oakland	ARC	PAR	CHS-MC	CHOP	Total
Total	212	199	222	132	168	150	150	1233
Gender								
Male	84.0%	71.9%	61.0%	79.5%	87.5%	75.3%	87.3%	77.2%
Female	16.0%	28.1%	39.0%	20.5%	12.5%	24.7%	12.7%	22.8%
Race/Ethnicity*								
American Indian/Alaska Native	0.0%	0.5%	2.3%	0.0%	0.0%	0.0%	0.0%	0.5%
Asian, Native Hawaiian, Pacific Islander	0.0%	0.0%	1.4%	1.0%	1.0%	1.0%	0.0%	0.6%
Black/African American	10.0%	1.5%	8.2%	14.0%	11.0%	14.0%	80.0%	17.9%
White/Caucasian	19.0%	41.7%	58.6%	67.0%	78.0%	82.0%	16.0%	50.3%
Hispanic or Latino	58.0%	38.7%	11.8%	9.0%	4.0%	1.0%	1.0%	20.1%
Other/Multiple Race	12.0%	17.6%	17.7%	8.0%	7.0%	2.0%	3.0%	10.5%
Age								
Less than 15 years	12.0%	13.6%	13.2%	16.7%	18.5%	14.7%	11.3%	14.1%
15-18 years	87.0%	86.4%	85.4%	83.3%	81.5%	85.3%	88.7%	85.5%
Greater than 18 years	0.0%	0.0%	1.4%	0.0%	0.0%	0.0%	0.0%	0.3%
Family								
Single parent family	47.5%	52.8%	50.2%	52.3%	39.3%	48.0%	61.3%	50.0%
Weekly alcohol use in home	28.0%	51.8%	45.5%	19.8%	35.2%	24.8%	12.2%	32.8%
Weekly drug use in home	24.0%	43.7%	54.1%	9.9%	10.2%	12.8%	10.2%	26.2%

<sup>1</sup>Baseline data not currently available on 17 cases.

\* Under PETS, Race/Ethnicity data will be collected as separate data items in accordance with 1997 OMB guidelines.

**Table 2 continued**

	Sites							
Characteristics	Los Angeles	Tucson	Oakland	ARC	PAR	CHS-MC	CHOP	Total
Education								
5 <sup>th</sup> grade	1.0%	0.0%	0.0%	0.0%	0.0%	0.7%	0.0%	0.3%
6 <sup>th</sup> grade	3.0%	2.5%	1.4%	0.8%	2.4%	3.3%	1.4%	2.2%
7 <sup>th</sup> grade	9.0%	11.2%	4.5%	7.6%	10.8%	8.7%	4.1%	8.0%
8 <sup>th</sup> grade	25.0%	41.6%	20.0%	22.0%	27.5%	16.0%	19.6%	25.0%
9 <sup>th</sup> grade	28.0%	25.4%	25.9%	34.8%	24.6%	32.0%	31.1%	28.3%
10 <sup>th</sup> grade	22.0%	14.7%	31.4%	22.0%	22.2%	24.7%	22.3%	22.9%
11 <sup>th</sup> grade	12.0%	4.1%	13.6%	10.6%	12.0%	14.0%	16.2%	11.6%
12 <sup>th</sup> grade	0.0%	0.5%	2.7%	2.3%	0.6%	0.7%	5.4%	1.6%
Social Peers								
Regular peer alcohol use socially	69.0%	74.9%	74.1%	73.5%	63.1%	75.3%	45.9%	68.5%
Regular peer drug use socially	83.0%	81.1%	85.9%	93.1%	89.2%	91.3%	83.0%	86.2%
Living Situation								
Home	72.0%	86.9%	76.8%	90.9%	98.2%	93.3%	90.7%	85.7%
Foster home	2.0%	0.5%	0.5%	0.0%	0.6%	0.0%	0.0%	0.6%
Public housing	0.0%	1.0%	0.0%	3.8%	0.0%	0.0%	1.3%	0.7%
Friend/relative's home	15.0%	7.5%	13.0%	3.0%	1.2%	6.0%	8.0%	8.3%
Recovery home or unsupervised dorm	0.0%	0.0%	0.0%	0.8%	0.0%	0.0%	0.0%	0.1%
Half-way house or supervised dorm	1.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%
Hospital or residential care facility	1.0%	1.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.4%
Jail, detention or corrections	6.0%	0.0%	13.2%	0.0%	0.0%	0.0%	0.0%	3.4%
Shelter	0.0%	1.0%	0.5%	0.0%	0.0%	0.0%	0.0%	0.3%
Vacant buildings	2.0%	0.0%	0.5%	0.0%	0.0%	0.0%	0.0%	0.4%
Other	1.0%	1.5%	5.5%	1.5%	0.0%	0.7%	0.0%	1.7%

**Table 2 continued**

	Sites							
Characteristics	Los Angeles	Tucson	Oakland	ARC	PAR	CHS-MC	CHOP	Total
Environment								
In school	12.0%	79.3%	70.5%	96.2%	86.3%	90.6%	75.5%	69.8%
Employed	0.0%	6.0%	8.7%	55.3%	57.1%	40.5%	34.5%	25.4%
Unemployed	0.0%	51.3%	10.0%	2.3%	8.9%	6.6%	11.3%	13.7%
In jail/prison/detention	32.0%	1.5%	0.5%	0.0%	0.0%	0.0%	1.4%	6.0%
Current criminal justice involvement	100%	88.4%	57.7%	60.6%	54.8%	58.0%	75.8%	72.1%
Controlled environment	36.0%	68.8%	53.6%	16.7%	33.3%	25.5%	23.3%	39.2%
Ever been victimized	n/a	82.9%	85.0%	55.3%	51.2%	58.7%	64.0%	56.5%
Ever homeless/runaway	18.2%	20.6%	38.8%	13.6%	3.0%	8.7%	4.0%	15.2%
Prior Substance Abuse Treatment Episodes								
None	54.0%	56.3%	39.5%	68.9%	76.2%	73.2%	77.2%	61.5%
One	21.0%	25.1%	38.2%	11.4%	19.0%	16.1%	16.1%	22.3%
Two or more	27.0%	18.6%	22.3%	19.7%	4.8%	10.7%	6.7%	16.5%
Substance Use								
Past 30 days								
Alcohol	68.0%	49.7%	64.0%	63.6%	47.5%	58.6%	47.4%	57.4%
Cannabis	79.0%	56.3%	70.0%	80.3%	81.0%	77.4%	91.4%	75.4%
Crack/cocaine	57.0%	23.6%	11.8%	0.8%	0.6%	3.4%	0.7%	16.4%
Heroin/opioids	14.0%	7.5%	9.1%	3.0%	2.4%	3.4%	2.0%	6.6%
Inhalants	7.0%	4.0%	2.3%	1.6%	2.4%	1.3%	0.0%	2.9%
PCP	9.0%	1.5%	1.8%	0.8%	0.0%	0.0%	4.0%	2.7%
Hallucinogens	13.0%	16.1%	18.6%	11.4%	4.2%	4.0%	0.7%	10.5%
Other sedatives/ hypnotics/ tranquilizers	9.0%	4.0%	2.7%	3.1%	2.4%	1.4%	6.0%	4.2%
Amphetamines	31.0%	8.5%	21.8%	0.8%	1.2%	5.4%	0.0%	11.5%

**Table 2 continued**

	Sites							
Characteristics	Los Angeles	Tucson	Oakland	ARC	PAR	CHS-MC	CHOP	Total
Barbiturates	8.0%	10.1%	3.6%	3.1%	1.8%	2.7%	1.4%	4.7%
Other drugs	0.0%	2.5%	0.0%	1.6%	0.6%	2.0%	0.0%	0.9%
Weekly								
Alcohol	23.9%	38.4%	44.7%	20.5%	13.1%	22.0%	12.7%	26.6%
Marijuana	45.8%	70.4%	73.1%	74.2%	66.7%	64.0%	80.7%	46.0%
Crack/cocaine	5.1%	16.2%	6.2%	0.0%	0.0%	0.0%	0.0%	2.6%
Heroin/opioids	0.7%	0.0%	1.5%	0.0%	0.0%	0.0%	0.0%	0.4%
Other drugs	2.1%	11.6%	12.0%	2.3%	0.0%	70.0%	0.0%	11.0%
Age of first use under 15	87.5%	96.5%	93.8%	87.1%	79.8%	88.0%	83.9%	88.6%
Mental Health								
Mental distress	49.0%	67.3%	68.6%	36.4%	12.5%	40.0%	20.7%	44.6%
Acute traumatic distress	n/a	52.0%	94.1%	19.2%	8.9%	16.1%	12.7%	32.1%
Attention deficit hyperactivity disorder	73.0%	61.8%	72.7%	53.8%	28.0%	53.3%	20.0%	54.1%
Conduct disorder	66.0%	74.4%	94.1%	62.9%	39.9%	59.3%	52.7%	65.3%
Biomedical								
Health Problem Index	36.0%	40.7%	47.7%	31.1%	26.2%	22.1%	23.5%	33.8%
Substance Severity								
No use	2.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.5%
Use	18.0%	1.5%	1.0%	0.0%	3.0%	3.3%	9.3%	5.5%
Abuse	28.5%	19.6%	11.1%	40.2%	64.9%	36.7%	54.0%	34.4%
Dependence	8.0%	10.1%	15.4%	8.3%	6.0%	8.7%	13.3%	10.2%
Physiological Dependence	40.8%	68.8%	72.6%	51.5%	26.2%	51.3%	23.3%	49.3%

**Table 2 continued**

	Sites							
Characteristics	Los Angeles	Tucson	Oakland	ARC	PAR	CHS-MC	CHOP	Total
Perception								
Perceives alcohol and other drugs as a problem	19.7%	53.8%	66.8%	31.8%	11.4%	28.6%	9.4%	33.7%
HIV Risk								
Sexually active in past 90 days	n/a	54.5%	70.0%	60.8%	66.7%	70.0%	89.8%	56.4%
Multiple sexual partners in past 90 days	n/a	40.9%	40.0%	32.3%	30.3%	24.7%	68.0%	32.7%
Unprotected sex in past 90 days	n/a	28.3%	66.0%	22.7%	12.9%	31.8%	27.7%	27.9%
Any needle use in past 90 days	n/a	3.0%	2.8%	0.8%	0.6%	0.7%	1.3%	1.4%

Table 3 shows the interim response rates for each round of data collection conducted by the study sites under the ATM and CYT grant programs. Although data collection is still underway, sites have maintained exceptionally high response rates among those eligible for interviews.

Three factors contributed to the steeper attrition rate in Los Angeles between the 6- and 12-month interviews. One is that the respondents had no in-person contact for the 6 months between the 6- and 12-month follow-up interviews; this had a significant effect on retention and follow-up. Second, Los Angeles paid respondents only \$15 per interview and this was much less of an incentive to encourage continued participation. Last, a large number of the adolescents have entered the California Youth Authority (CYA) (prison for youths) and the Authority is currently not allowing researchers access to youth.

Part of the strategy for improving Los Angeles' participation rate is to bring the incentive payment in line with the remuneration used by the other Longer-term Adolescent Study sites. Second, the researcher is in active negotiation with the Director of the California Youth Authority to reach an agreement that would allow interviewers access to the study participants who have entered the facility.

**Table 3. Interim Response Rates**

Site	3-month interview	6-month interview	9-month interview	12-month interview
<b>Los Angeles</b> 9/04/00	90% (451)	88% (422)	na na	77% (236)
<b>Tucson</b> 8/29/00	97% (235)	94% (196)	92% (171)	88% (130)
<b>Oakland</b> 8/11/00	91% (205)	92% (177)	90% (135)	95% (81)
<b>ARC</b> 9/30/00	96% (132)	95% (132)	93% (130)	95% (99)
<b>PAR</b> 9/30/00	99% (168)	99% (168)	100% (156)	95% (135)
<b>CHS-MC</b> 9/30/00	100% (150)	99% (150)	96% (150)	95% (136)
<b>CHOP</b> 9/30/00	96% (150)	95% (150)	90% (150)	92% (129)
<b>Total</b>	96% (1480)	95% (1358)	94% (858)	90% (895)

na = Los Angeles does not conduct 9 month interviews.

Note: Numbers in parentheses ( ) indicates number of cases eligible, to date, for the interview.

## Instruments

To generate tentative time estimates, the entire expanded battery was pre-tested with three adolescents recruited under existing grants with a release from two of the participant agencies. Based on these interviews we anticipate that the assessment will take approximately 87 minutes and that with breaks and the time to update the consent and locator forms, the total time for the participant will be 110 minutes.

- Global Assessment of Individual Needs (GAIN):** The GAIN is a standardized bio-psycho-social assessment battery for clinical and research use. The GAIN measures a wide variety of domains of interest, including: Substance Use, Abuse, and Dependence; Physical Health; Risk and Prevention; Mental Health; Environment and Living Situation; Legal status; as well as School and Vocational status. In addition, the PETS team has added several items to the above domains the GAIN, in collaboration with its developer, Chestnut Health Systems, to make the existing battery even more comprehensive. More information on the original GAIN can be found at [http://chestnut.org/li/gain/GAIN\\_QxQ/index.html](http://chestnut.org/li/gain/GAIN_QxQ/index.html).
- Digit Span Subtest of the Wechsler Adult Intelligence Scale, Third Edition (WAIS-III):** The Digit Span component of the WAIS-III will measure working memory. In this test, the client is asked to repeat a series of numbers, first forward, then backward. Extensive data are available on the psychometric properties of the WAIS.
- Tower of Hanoi:** The Tower of Hanoi is a neuropsychological test that will measure executive cognitive functioning. It uses a 3-pronged peg-board and 4 rings of different sizes that the client moves in a specified order from one peg to another. Performance is based on speed, accuracy, and the number of moves required to solve the problem.

- **Biological Specimens:** Urine toxicology analyses have been added to the data collection protocol.

## Procedures

Both ATM and CYT grant programs are funded by CSAT. Both already include interviews at baseline, 3-, 6-, and 9-months post-study admission. The ATM grant program includes a 12-month follow-up data collection wave. Although 12-month follow-ups were initially missing in the CYT grant program, they were recently added. The PETS team recommends adding additional interviews following adolescents up to 2.5 years after treatment. Not only would this yield longer-term outcomes, but also the longitudinal design with multiple waves of data collection allow CSAT to examine trajectories for the various outcomes.

We will collect the maximal amount of data possible under the current PETS contract, which ends September 30, 2002. If possible, a six-month extension of the current PETS contract would maximize the likelihood of analyzing complete (versus preliminary) data for each site. We have selected a core set of seven sites upon which to focus the PETS Adolescent Study efforts. These sites include all four CYT sites and three first round ATM sites, Los Angeles, Oakland, and Tucson. The CYT sites will collect approximately 600 30-month follow-up interviews, and the ATM sites will collect approximately 600 24-month interviews and 600 30-month interviews.

Table 4 shows the details of the anticipated sample sizes by site and wave. These sample sizes assume that the current success of the sites in tracking and securing cooperation of the treated clients will continue at the historical success rates of approximately 90-95%. Since the PETS Adolescent Study design calls for each site's local staff to continue to be responsible for tracking and interviewing, there is good reason to expect to maintain these rates.

**Table 4. Completed Interview Projections**

<b>Interview Wave</b>	<b>Program/Site</b>	<b>Interviews</b>
<b>24 month</b>	<b>Total</b>	<b>594</b>
	ATM-Tucson	144
	ATM-LA	229
	ATM-Oakland	221
<b>30 month</b>	<b>Total</b>	<b>1194</b>
	<b>CYT Subtotal</b>	<b>600</b>
	CYT ARC	132
	CYT PAR	168
	CYT CHS-MC	150
	CYT CHOP	150
	<b>ATM Subtotal</b>	<b>594</b>
	ATM-Tucson	144
	ATM-LA	229
	ATM-Oakland	221

Respondents at all sites were interviewed at baseline, 3, and 6 months under grants from CSAT. All sites but Los Angeles completed 9-month interviews. Clients in the Los Angeles, Tucson, and Oakland ATM sites will be interviewed at 24 months after treatment under PETS and all sites will conduct 30-month interviews under the PETS Longer-term Adolescent Study. Although we would have preferred having 24-month interviews at all sites, the timing of this study does not allow this. Many CYT study respondents have already reached this milestone. The timing of the interviews allows us to periodically assess how the adolescents are functioning and permits a sufficient number of data points to develop outcome trajectories for them. Less frequent data collection would impair our ability to gain an understanding of the interrelationship and variation among the outcome variables over time.

The research design for the adolescent study is intended to create an adolescent follow-up study that builds upon adolescent substance abuse treatment outcome studies that are already under way. This collaborative effort between the CSAT adolescent follow-up study team and existing grant programs allows for maximization of the amount of time the follow-up period can be extended. Building on existing studies also enables CSAT to capitalize upon the efforts of other investigators to maximize resources and render a more efficient and economical follow-up study. An additional advantage of this strategy compared to developing a new set of studies is that much needed findings can be disseminated much more quickly.

The principal elements of the proposed data collection plan design are:

- Follow-up interviews at 24- and 30-months for ATM and at 30 months for CYT, that extend the treatment outcome analyses beyond the 12 months of follow-up data being collected with the current grant funding;
- Use of a standard instrument across sites that enhances the instrument currently employed by the grantees for data collection under the CSAT grant;
- Collection and analysis of urine specimens from interviewed clients; and



- Tracking of subjects between interview waves.

**Informed Consent:** All consent forms in use during the initial interviewing rounds indicated that the study site may opt to recontact respondents within 12 months of that date for the purpose of conducting an additional follow-up interview. Respondents consented to be re-contacted, but are not under obligation to be re-interviewed. Thus, consent procedures already in place allow for the sites to recontact respondents as part of the data collection activities. A new consent form is signed prior to each interview.

Beginning with PETS-funded interviews, a separate consent form will be added for collection of urine samples, and it will likewise explain the confidentiality protections. Interviewers at each of the study sites will review both the interview and urine sample consent forms with the respondents before requesting signatures. Consistent with other studies being conducted as part of PETS, a Federal Certificate of Confidentiality is being sought and consent forms have been amended to inform respondents of this additional protection. Client records for the study are also covered by the Privacy Act System of Records 09-30-0036, Alcohol Drug Abuse and Mental Health Epidemiologic Data, most recently published in the Federal Register (Vol. 64, No. 11, Page 2914) on January 19, 1999.

**Interviews:** At the time of their first interview, each client completed an informed consent form, consent for disclosure form, and provided information for a locator form. Where applicable, the client is also given an appointment card noting the target date for the next interview, which falls on the “anniversary” of their study enrollment date. The consent form explains the purpose of the study and the intended use of information requested in the follow-up interview and also requests the client’s consent to be re-contacted at future intervals for additional follow-up. The locator form includes current information on the client’s address, phone number, and other contact information. Clients are also specifically asked for their consent to permit the team to contact agencies listed on the disclosure form for the sole purpose of completing the follow-up interviews.

Clients are contacted by letter and/or telephone to confirm the date and time of the appointment for each of the follow-up interviews. Clients are reminded that their participation is voluntary, and that they will be compensated for completing an interview. Clients are also told that their incentive payment will be increased by an additional \$10 if they complete their interview within one week of their anniversary date.

Clients are interviewed at centrally located site offices unless special circumstances require that the interview be conducted elsewhere. All efforts are made to conduct the interviews in person, including sending interviewers to a client’s home or to the treatment program in which a client may be enrolled. However, if a client has moved out of the area, or if a client cannot come to the facility and the client’s neighborhood is deemed unsafe for the interviewer to enter, the interview will then be done by telephone.

Telephone interviews are also conducted with clients who are residing in State correctional facilities at the time of their interview. We anticipate that about 30 percent of the interviews will be conducted by phone, with the rate being higher for older participants who are more likely to move to another area or become incarcerated.

Data collection consists of administering the follow-up interview specified in Section A-12. The consent procedures and the locator update form take about 5 minutes each. The GAIN interviews generally take about 60 minutes to complete and the Supplemental Assessment Form about 40 minutes. The data collection procedures described here apply to all follow-up interviews to be conducted as part of the PETS family of studies. Consent forms include the provision of urine samples and payment of \$15 for the urine sample.

**Biological Samples:** The PETS Longer-term Adolescent Study will seek to collect a urine specimen from each person who completes an in-person interview. The urine sample will be used to validate self-reports of current drug use. A SAMHSA NLCP certified laboratory will be contracted to analyze the specimens and report the test results. The laboratory will be asked to screen for a panel of five drugs, using immunoassay screening. Since the results will not be used forensically, the extra step of GC/MS confirmatory testing will not be conducted. The five drugs will be marijuana, cocaine, amphetamines, opiates, and benzodiazapines. The immunoassay screen will apply the NIDA standard cutoff levels: marijuana (THC, 50 ng/ml), cocaine (300 ng/ml), amphetamines (1,000 ng/ml), and opiates (2,000 ng/ml). There is no NIDA standard for benzodiazapines, so we will specify that the laboratories apply the lowest commonly used cutoff level.

**Incentive Fees:** Clients have an opportunity to earn a total of \$75 in incentive fees. This sum can be broken down as: \$5 if the client contacts the site for tracking; \$5 to confirm the follow-up notice; \$40 to complete the 1.5 hour interview; \$10 if they complete the interview within one week of the target date, and \$15 for providing a urine sample.

## **Analyses**

One key goal of the PETS project is to gain a greater understanding of the changes in client behavior associated with multiple interactions with the treatment system over time. These studies offer the potential to make a major contribution to our understanding of the longitudinal patterns of substance abuse and treatment among adolescents. With multiple interviews covering up to a 2.5-year period after treatment admission, the PETS Longer-term Adolescent Study offers a uniquely rich opportunity to examine these issues. The analysis plan for the PETS Longer-term Adolescent Study resembles that developed for adult sub-studies within the PETS project, with modifications based on developmental and other issues relevant to this age group.

The PETS analytic approach will proceed in three phases: the analyses of Phase 1 will be descriptive in nature; Phase 2 will include the basic modeling analyses that address the fundamental research questions; and Phase 3 analyses will be more focused on subgroups and highly specific questions.

**Phase 1.** This phase will serve a preliminary analysis function, primarily to characterize the sample of clients who were recruited for the four CYT sites and the three ATM sites and who form the sample for the PETS Longer-term Adolescent Study. These descriptive analyses will focus primarily on the demographic makeup of the sample, the severity of substance abuse, and the types of treatment episodes over the longitudinal time frame. A preliminary description of the sample population is provided in Table 2.

The analytic focus will turn to the computation of sample descriptive statistics (e.g., means, proportions) for critical variables. Variables will include substance abuse severity and treatment use over time, broken down by sociodemographic and clinical-historical characteristics, treatment utilization and modality, length of stay, and treatment compliance and completion rates. For example, descriptive data generated at this stage will include key client characteristics by the previously noted clinical and utilization variables. Table 5 of the Phase 1 descriptive analyses:

**Table 5. Average Duration of Treatment by Client Sociodemographics and Type of Care at Study Entry**

Type of Care	Average Duration of Treatment (Days)									
	Gender		Race			Ethnicity		Education		
	Male	Female	White	Black or African American	Race not tabulated	Hispanic	Not Hispanic	Currently in school		HS grad /GED
								Yes	No	
Outpatient										
Intensive Outpatient										
Modified Therapeutic Community										

Phase 1 will provide a comprehensive picture of the client sample in terms of background, clinical, and treatment variables across assessment waves. Where appropriate, statistical techniques such as chi-square homogeneity of proportions tests (with odds ratios), independent samples *t*-tests, and analysis of variance (ANOVA), with weighting where appropriate, will be used to indicate statistically significant differences or relationships. Phase 1 will illustrate, in a basically static (cross-sectional) fashion, key characteristics of the sample, including the identification of potential confounding variables. This will serve to inform the next level of modeling analyses in Phase 2.

**Phase 2.** The second stage of the analyses will focus on model development and testing. The ultimate goal in Phase 2 is to take full advantage of the richness of the data on client substance use patterns, addiction severity and treatment episodes, as well as the dynamic inter-relationship of these measures over the multiple interview periods. Models will attempt to explain variation in substance use over time, as a function of individual characteristics and treatment influences. Here, the effects of maturational and developmental factors on the trajectory of adolescents' substance abuse disorders may be examined. To accomplish this objective, the investigators will capitalize on recent statistical developments in modeling techniques for multi-wave longitudinal data.

Highly sophisticated statistical methods for the analyses of longitudinal data have made substantial advances over the last decade, and user-friendly software packages and documentation have been developed. Latent growth curve modeling (LCM) and multi-level modeling (MLM) provide flexible techniques to address questions related to change ("growth") over repeated measurement occasions, allowing for the complex modeling of growth or change as a function of predictor, moderating, and mediating variables. In general, LCM and MLM represent two different practical applications of the same basic approach. LCM offers some advantages, (e.g., an overall goodness-of-fit-test) and will be highlighted here. LCM will provide the critical statistical tool to approach the complex issues characterizing the interplay of substance abuse and treatment episodes over two and one-half years of the clients' life course.

Briefly, LCM is based on confirmatory factor analytic methods and developments in covariance analysis more generally. The model builds a developmental growth construct representing the function of repeated observations over time (referred to as growth curves, trajectories, time trends, etc.). LCM utilizes latent factors to estimate the fixed and random components associated with individual differences in changes (outcomes) over time. The flexibility of the LCM approach means that a variety of forms of longitudinal analyses can be conducted. These include the exploration of mediational factors influencing the change process, analysis of multiple change processes for more than one outcome variable, and multi-sample (e.g., gender) comparisons of change trajectories.

The fundamental conceptualization underlying LCM is the notion that each individual has a unique pattern of change, or growth trajectory. For each of these individual growth curves, the intercept (i.e., initial status) and slope (i.e., rate of change) are estimated. This growth curve can be characterized by a linear or nonlinear function. Moreover, the growth trajectory can be modeled as a function of fixed or time-varying covariates or explanatory variables. In this life course trajectory/treatment evaluation context, a goal is to further our understanding of "what works for whom." Since LCM estimates individual differences in change over time, differential treatment response can be examined, in an attempt to identify factors associated with stronger (or weaker) help-seeking, treatment engagement, and treatment responsiveness.

One of the strengths of LCM is its ability to examine the relationships between multiple levels of data. For example, at Level 1 (within-person), the analysis models growth parameters for each client (i.e., the intercept or initial status and growth trajectory/rate of change/slope over the multiple assessment periods). The Level 2 (between-person) analysis next uses these Level 1 growth parameters as dependent variables (“slope-as-outcome” approach) to model the relationship between growth or change in relation to key predictor (treatment dose as a time-varying covariate at Level 1) and control variables (e.g., baseline case mix variable). Accompanying parameter estimates and tests of statistical significance are provided. In addition to tests of fixed effects on change over time (e.g., treatment dose on rate of change in substance abuse severity), LCM also provides useful variance partitioning estimates (e.g., relative proportion of between-subject variability in substance abuse severity as a function of initial status and rate of change).

These basic Phase 2 modeling strategies will provide rigorous tests of rates of change in substance abuse within and across clients, as well as providing estimates of treatment impacts while controlling for background characteristics and potential confounds. These models will be expanded and fine-tuned to better address questions of the temporal relationship between treatment episodes and addiction severity, identification of moderating variables (e.g., treatment motivation, comorbidity), and differential relationships by primary substance of abuse and treatment modality. Table 6 represents sample table shells for such analyses.

**Table 6. Treatment Dose, Gender and Addiction Severity Over 30 Months: A Growth Curve Analysis**

Fixed Effects			
Predictor	Coeff	SE	t ratio
For base rate (phi)			
Intercept (beta)			
Gender (beta)			
For linear slope (phi)			
Intercept (beta)			
Gender (beta)			
For treatment effect (phi)			
Intercept (phi)			
Gender (beta)			

Variance Components			
Parameter	Estimate	Chi-Square	df
Variance (between-person intercept) (tau)			
Variance (between-person growth) (tau)			
Variance (sampling variance) (sigma-squared)			

**Phase 3.** The major objectives of Phase 3 are to model the course of substance abuse and treatment over time across client subgroups. LCM will be conducted, for example, within type of treatment modality, for substantive impact as well as to prevent modality from confounding analytic results. For example, analyses might include examining the role of psychiatric comorbidity or cultural and environmental factors on the trajectory of substance abuse among these adolescents. Analyses might also address the role of the client's primary drug of abuse (likely marijuana versus alcohol) on treatment patterns and responsiveness among those receiving residential services, or the relationship between client sociodemographic characteristics and source of payment in models of the course of treatment utilization in outpatient treatment. These analyses may also focus on certain groups of special interest such as women, clients of various racial/ethnic groups, and adolescents whose substance abuse and/or treatment histories begin at younger versus older ages.

Phase 3 analyses will also allow exploration of the data using several other advanced statistical techniques. For example, Latent Transition Modeling (LTM) is similar to LCM but utilizes discrete or categorical latent variables. This method models transitions over time between discrete variables representing "stages." LTM could be used to identify variables (such as cumulative treatment history, comorbidity, etc.) that predict the transition probabilities between stages such as reduced use, abstinence, and relapse. Questions pertaining to "time-to-event" sorts of hypotheses, such as time to abstinence (and its predictors) can be modeled using life table or survival analytic approaches. Lastly, "person-based" methods, such as Configural Frequency Analysis may be explored in attempts to create typologies or clusters of substance abusing clients, clusters or patterns of treatment response over time, and an examination of their interrelationships.

**Site-specific Analysis Plan for ATM:** The three ATM sites (Los Angeles, Oakland, and Tucson) bring approximately 600 cases to the PETS Adolescent Study, enabling powerful and sophisticated statistical approaches to the analysis of treatment effects on adolescents. Furthermore, for almost a year, the five ATM sites discussed in this proposal have been working collaboratively as a part of the ATM's Cross-Site Analysis Workgroup (CSAW) to design and implement analytic strategies for conducting cross-site analyses. Through monthly meetings and three conferences, CSAW has developed methods that will be of substantial benefit to the analysis of subsequent waves of data conducted under the adolescent PETS. Currently, four subcommittees of the CSAW collaboration are developing cross-site analyses of a) developmental moderators and mediators of treatment effectiveness, b) family and environmental mediators and moderators of treatment

effectiveness, c) the mediating effects of coping skills in relation to adolescent substance abuse treatment outcomes and d) substance abuse outcomes of treated youths in comparison to similar youths who receive no treatment.

Analytic approaches that are enabled with the large sample our sites bring to PETS include structural equation models of the mediating and moderating influences on youth outcomes, and sophisticated case-mix adjustment analyses of treatment effects. For instance, using propensity score analysis, we can describe the similarity of each individual entering one of our residential sites to the cohort entering either CYT or our outpatient site. Rosenbaum and Rubin (1983, 1984, and 1985) demonstrate that conditioning group comparisons on estimated "propensity scores" can reduce the bias that results from baseline differences between cohorts. This case-mix adjustment approach could be used to estimate relative effects of treatment modality, treatment length, geographic variation, and many other factors of critical importance.

It is also important to note that these sites will serve as comparison groups for each other. The adolescents participating in these studies also include some sub-samples that are sufficiently large to support matching and/or subgroup analyses. Perhaps more importantly comparisons between long- and short-term residential and step-down treatment models can be examined for the entire subject population as well as various subgroups. Furthermore the 30-month follow-up data of these projects can be compared to the outcomes of the 600 youth participants in the CYT project.

**Site-specific Analysis Plan for CYT:** The main analysis will be exploratory and use a combination of multi-variate regression, event analysis, path analysis and structural equation modeling. The CYT investigative team's logic model, shown in Figure 1, goes beyond the simple *black box* approach of the randomized trial or time in single treatment typical of most studies. This model captures the role of actual treatment delivered initially (e.g., type, dosage, therapeutic alliance, group composition), subsequent treatment (i.e., treatment career), key mediators for outcomes (e.g., changes in motivation, coping styles, family and peers), and the moderating role of the adolescent's situation when he/she walks in the door (e.g., presenting problem, history, comorbid conditions, initial levels of motivation, coping styles, family relations and peer networks).

The current CYT analyses are looking at the subgroups of clients and predictors of the initial changes and outcomes. Under PETS, we would want to expand these into analyses to see if we can predict initial outcomes and subsequent treatment careers by incorporating these moderators and mediators. As longer term follow-up data become available, this process can be replicated for each data collection wave. We can also examine who goes on to use other types of drugs (e.g., cocaine, heroin) and/or become stable. This kind of systematic dismantling, refining and reconstructing of clinical and empirical concepts, by a large yet unified group of investigators, will yield a highly unique programmatic investigation of therapy process and outcome.

## **Publications**

It is CSAT's intention to publish the findings from this and other PETS studies in a variety of media and forums. Professional journals such as *Addiction*, *Journal of Substance Abuse Treatment*, *Health Services Research*, *Journal of Addictive Diseases*, and the *Journal of Maintenance in the Addictions* are some of the planned venues. In addition, CSAT reports will be published annually with the earliest planned for the second quarter of calendar year 2002. The PETS team plans to produce a number of publishable analysis reports over the course of the Longer-term Adolescent Study. Given the unique character of the clinical interview database on adolescents, there are a number of significant analytical issues that can be addressed in the near term. At the end of the project, the full analytic database will be made available for public use after careful application of disclosure procedures to preserve confidentiality of client identities.

## **Project Schedule**

The PETS Longer-term Adolescent Study is building upon two CSAT-funded grant programs that are currently underway, CYT and ATM. For the three ATM sites selected, 24- and 30- month interviews will be added under the PETS family of studies. For the four CYT sites, PETS will add a 30-month interview. Table 7 presents the time schedule for these interviews. The PETS-funded interviews are shown below the dotted line on the table



**Table 7. Longer-term Adolescent Study Activity Timeline**

	<u>Los Angeles</u>		<u>Tucson</u>		<u>Oakland</u>	
	<b>Start</b>	<b>End</b>	<b>Start</b>	<b>End</b>	<b>Start</b>	<b>End</b>
Baseline interview	Feb 99	Apr 00	Jan 99	Dec 00	Apr 99	Apr 00
Treatment phase	Feb 99	Apr 01	Jan 99	Mar 01	na	na
3-month follow-up interviews	May 99	Jul 00	Mar 99	Mar 01	Jun 99	Aug 00
6-month follow-up interviews	Aug 99	Oct 00	Jun 99	Jun 01	Sep 99	Nov 00
9-month follow-up interviews			Sep 99	Sep 01	Dec 99	Feb 01
12-month follow-up interviews	Feb 00	Apr 01	Dec 99	Dec 01	Mar 00	May 01
PETS Interviews						
24-month follow-up interviews	Feb 01	Apr 02	Dec 00	Feb 02	Dec 00	Apr 02
30-month follow-up interviews	Aug 01	Sep 02	Jul 01	Jun 03	Aug 01	Sep 02

	<u>ARC*</u>		<u>PAR</u>		<u>CHS-MC</u>		<u>CHOP</u>	
	<b>Start</b>	<b>End</b>	<b>Start</b>	<b>End</b>	<b>Start</b>	<b>End</b>	<b>Start</b>	<b>End</b>
Baseline interview	Sep 98	Dec 99	Jun 98	Feb 00	Jun 98	Dec 99	Jul 98	Jan 00
Treatment phase	Sep 98	Mar 00	Jun 98	May 00	Jun 98	Mar 00	Jul 98	Apr 00
3-month follow-up interviews	Dec 98	Mar 00	Sep 98	May 00	Sep 98	Mar 00	Oct 98	Apr 00
6-month follow-up interviews	Mar 99	Jun 00	Dec 98	Aug 00	Dec 98	Jun 00	Jan 99	Jul 00
9-month follow-up interviews	Jun 99	Sep 00	Mar 99	Nov 00	Mar 99	Sep 00	Apr 99	Oct 00
12-month follow-up interviews	Sep 99	Dec 00	Jun 99	Feb 01	Jun 99	Dec 00	Jul 99	Jan 01
PETS Interviews								
24-month follow-up interviews								
30-month follow-up interviews	Mar 01	Jun 02	Dec 00	Aug 02	Dec 00	Jun 02	Jan 01	Jul 02

Note. \*ARC started in 6/98 at 7 sites, but was then shut down in 8/98, re-deployed in one site, and restarted in 9/98. Dates below the dotted line will be covered under PETS.

**Appendix 1**  
**Estimation Procedures**  
**PETS Longer-term Adolescent Studies**

In the development of statistical models to explore and analyze the data, a simple random probability sample of observations is not a requirement. In fact, one specific emphasis of PETS is the identification of a variety of component studies that will each contribute a different set of methods or procedures. If consistent results are found across these disparate populations and using these different methods, this lends even further credence to the results obtained. Nevertheless, models that fit the study participants well may not provide a useful fit for the general population or subgroups of the population, perhaps due in part to differences between the study participants and the population characteristics of adolescents receiving treatment.

In the analysis of the PETS data for the Longer-term Adolescent Study, a number of comparisons between estimated parameters are planned. It is important to assess the power of hypothesis tests to detect existing differences in the corresponding population parameters. Our calculations indicate that the sample size for this study will generally be quite sufficient to detect substantively and statistically significant changes in the behaviors and characteristics of the individuals being studied.

In this discussion, we focus on the ability to detect changes over time based on data collected on a single sample of persons, a chief focus in analyses planned for these data. The data are considered in various groupings. To evaluate the power to detect differences, we look at the minimum sample size available for a program and the typical sample size available. We also look at a sample size of 600, which roughly reflects the sample size available if one were to consider all ATM participants in the study who received residential treatment or all CYT participants in the study who received outpatient care. Again we note that in pooling data across programs without using sample weights care must be taken in drawing conclusions from subsequent analyses.

In assessing the power to detect existing differences between population parameters, one must take into account the expected correlation between a client's measurement at time 1 and the same client's measurement at time 2. For the purpose of the power evaluation here, we consider a range of correlation from .40-.80. The choice of this range of values was based on estimates from the substance abuse literature documenting high stability of alcohol and drug use. Finally, for the purposes of these power calculations, we are regarding the data as having been gathered from a simple random sample of persons in a particular program now and in the indefinite future.

For illustrative purposes, we evaluate the ability to detect a difference of both 5 percent and 10 percent, with a Type 1 error rate set at  $\alpha = .05$ . We consider the parameter of interest to be the proportion of clients with chronic/high intensity substance abuse problems (vs. the remaining clients) who move from this chronic/high intensity category to the other (thus, representing improvement). For the purposes of these calculations, we have assumed that the initial proportion of persons entering substance abuse treatment with a chronic/high intensity alcohol or drug problem was about 90 percent. This figure is consistent with data obtained from other substance abuse program studies, and thus appears to be a reasonable assumption. We then determine the power to detect a lowering of this proportion (over time) to values of 85 percent (a 5 percent difference) and 80 percent (a 10 percent difference).

We consider five sample sizes for subgroup analyses: (1) 600 clients, representing roughly the full sample yield if all participants in the ATM or CYT projects are grouped together; (2) 220 clients; (3) 175 clients; (4) 150 clients; and (5) 132 clients.

The resulting power values appear in Table 7 below. We discuss each combination of sample size and “size of difference” in turn. The smaller the size of the difference one is trying to detect, the less the power to detect the change for a given sample sizes. Thus, the estimated power values for detecting a change from 90 to 85 percent are somewhat less than those associated with detecting a change from 90 to 80 percent for each sample size. We consider first the power for detecting a change from 90 to 85 percent.

With a sample size of 600, the power to detect a change from 90 to 85 percent ranges from slightly under 96 percent to 100 percent, depending on the correlation. That is, the power to detect this 5 percent change in a sample size of 600 exceeds 95 percent across the specified correlation values.

With a sample size of 220, the power to detect a change from 90 to 85 percent ranges from approximately 65 to 97 percent, depending on the correlation. That is, the power to detect this 5 percent change in a sample size of 220 exceeds 66 percent across the specified correlation values. The degree of correlation substantially affects the power that can be expected, but it is relatively high even for the lower values of correlation considered.

With a sample size of 175, the power to detect a change from 90 to 85 percent ranges from approximately 57 to 93 percent, depending on the correlation. That is, the power to detect this 5 percent change in a sample size of 175 exceeds 57 percent across the specified correlation values. The degree of correlation substantially affects the power that can be expected, but again it is relatively high even for the lower values of correlation considered.

With a sample size of 150, the power to detect a change from 90 to 85 percent ranges from slightly under 52 percent to 89 percent, depending on the correlation. That is, the power to detect this 5 percent change in a sample size of 150 exceeds 51 percent across the specified correlation values. The degree of correlation substantially affects the power that can be expected, but it is similar to the range of values for a sample size of 175.

With a sample size of 132, the smallest sample for an individual program, the power to detect a change from 90 to 85 percent ranges from approximately 47 to 86 percent, depending on the correlation. That is, the power to detect this 5 percent change in a sample size of 132 exceeds 47 percent across the specified correlation values. The degree of correlation substantially affects the power that can be expected, and only for this sample size does the ability to detect the specified difference drop below 50 percent, and then only for one of the specified correlation values.

As mentioned above, the power to detect differences of a drop of 10 percent from an initial value of 90 percent is larger, substantially larger for the smaller sample sizes being considered.

With a sample size of 600, the power to detect a change from 90 to 80 percent ranges is essentially 100 percent, regardless of the correlation. That is, the ability to detect such a 10 percent change in a sample size of 600 is almost certain for the specified correlation values.

With a sample size of 220, the power to detect a change from 90 to 80 percent ranges from approximately 98 to 100 percent, depending on the correlation. That is, the power to detect this 10 percent change in a sample size of 220 exceeds 98 percent across the specified correlation values.

With a sample size of 175, the power to detect a change from 90 to 80 percent ranges from slightly under 96 percent to 100 percent, depending on the correlation. That is, the power to detect this 10 percent change in a sample size of 175 exceeds 95 percent across the specified correlation values.

With a sample size of 150, the power to detect a change from 90 to 80 percent ranges from approximately 93 to 100 percent, depending on the correlation. That is, the power to detect this 10 percent change in a sample size of 132 exceeds 93 percent across the specified correlation values.

With a sample size of 132, the power to detect a change from 90 to 80 percent ranges from approximately 90 to 99.9 percent, depending on the correlation. That is, the power to detect this 10 percent change in a sample size of 132 exceeds 90 percent across these specified correlation values.

**Table 8: Power Analysis Examples**

<b>Differences Between the Same Respondents Over Time</b> <b>Table of Power Associated with Detecting Two Degrees of Change:</b> <b>From 90 to 85 percent and from 90 to 80 percent</b>			
Sample size	Correlation of measure over time	From 90 to 85 percent	From 90 to 80 percent
600	0.4	0.958	1
600	0.5	0.980	1
600	0.6	0.993	1
600	0.7	0.999	1
600	0.8	1	1
220	0.4	0.656	0.984
220	0.5	0.724	0.994
220	0.6	0.804	0.998
220	0.7	0.891	1
220	0.8	0.968	1
175	0.4	0.572	0.958
175	0.5	0.638	0.979
175	0.6	0.721	0.993
175	0.7	0.822	0.999
175	0.8	0.930	1
150	0.4	0.518	0.931
150	0.5	0.581	0.961
150	0.6	0.663	0.984
150	0.7	0.769	0.996
150	0.8	0.894	1
132	0.4	0.476	0.901
132	0.5	0.536	0.940
132	0.6	0.616	0.972
132	0.7	0.722	0.992
132	0.8	0.858	0.999